Message

From: Davis, Eva [Davis.Eva@epa.gov]
Sent: 3/22/2017 3:33:21 PM
To: Cosler, Doug [DCosler@TechLawInc.com]; Eleanor Jennings [ejennings@teci.pro]; d'Almeida, Carolyn K. [dAlmeida.Carolyn@epa.gov]; Brasaemle, Karla [KBrasaemle@TechLawInc.com]; 'Dan Pope' [DPope@css-inc.com]; Henning, Loren [Henning.Loren@epa.gov]; Arvind Kutty [AKutty@TechLawInc.com]; Wayne Miller (Miller.Wayne@azdeq.gov) [Miller.Wayne@azdeq.gov]; Steve Willis [steve@uxopro.com]
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

Doug – I think we need to make sure that each of the issues with the model that you identified are mentioned in the path forward document, then that we reference your full comments document. Hopefully Carolyn will weigh in on this as well - Eva

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From: Cosler, Doug [mailto:DCosler@TechLawInc.com]
Sent: Wednesday, March 22, 2017 10:27 AM
To: Davis, Eva <Davis.Eva@epa.gov>; Eleanor Jennings <ejennings@teci.pro>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

Eva,

Per your question below, I'm looking at the NAPL dissolution paper now.

Yesterday Carolyn asked that I iput together a "formal" set of comments on their model and simulation efforts. I was planning on starting on this today and finish it before noon tomorrow (Thurs). Don't know how much of my comments you'll want to include in the "path forward" document.

Let me know what you think.

Doug

From: Davis, Eva [mailto:Davis.Eva@epa.gov]
Sent: Wednesday, March 22, 2017 9:39 AM
To: Eleanor Jennings <ejennings@teci.pro>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Henning, Loren <Henning.Loren@epa.gov>; Kutty, Arvind <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

Thanks for all the input – I will try to get one clean copy for everyone to review one last time. Bo Stewart was inadvertently left off the distribution list – ADEQ may want to forward to him for comments, he is more familiar with TEE modeling efforts and results, some of which are mentioned in this.

Doug, should more be added about the model? I have attached a paper on dissolution measurements made at ST12 which I recently got ahold of – maybe you can interpret it better than I can.

From: Eleanor Jennings [mailto:ejennings@teci.pro]
Sent: Wednesday, March 22, 2017 7:59 AM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; 'Dan Pope'

<DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

Attached are my edits to the version sent from Carolyn's 7:28 PM (EST) below email – really just a few comments. Just trying to help keep track of which draft is flying around and which draft/version is being responded to.

Attached is also an earlier draft (UXO Pro 2) that may have gotten lost in the shuffle, as it contains everything of mine regarding proposed testing (Steve Willis and I worked on a draft and sent both our comments in a combined document). This information was requested again in Carolyn's 7:28 PM (EST) draft from below email, thus why I'm thinking the earlier document may have gotten overlooked (a very easy thing to do with all of the drafts, versions, and edits simultaneously floating around).

MANY thanks for helping to compile this – it's a huge job with this many participants, and the efforts are very appreciated. Let me know if there is anything else I can do to help, or to be of assistance,
Eleanor

Eleanor M. Jennings, M.S. PhD
Principal Microbiologist, Biogeochemist

From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Tuesday, March 21, 2017 7:28 PM
To: Brasaemle, Karla <KBrasaemle@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>; Eleanor Jennings <ejennings@teci.pro>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

I added a few things in light blue

Carolyn d'Almeida
Remedial Project Manager
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"Because a waste is a terrible thing to mind..."

From: Brasaemle, Karla [mailto:KBrasaemle@TechLawInc.com]
Sent: Tuesday, March 21, 2017 2:25 PM
To: 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>; Eleanor Jennings <ejennings@teci.pro>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

I made a number of edits and included Carolyn's comment. I also edited the text at the end from Dan's original notes.

Karla Brasaemle, P.G.,
TechLaw, Inc.

415-762-0566

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Tuesday, March 21, 2017 12:44 PM
To: Davis, Eva <Davis.Eva@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Kutty, Arvind <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>; Eleanor Jennings <ejennings@teci.pro>
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

My initial notes on Eva's draft document. Mainly I've added the specific references (it's getting hard to keep track of all the site documents!), and a few comments.

From: Davis, Eva [mailto:Davis.Eva@epa.gov]
Sent: Tuesday, March 21, 2017 9:41 AM
To: d'Almeida, Carolyn K.; Dan Pope; Brasaemle, Karla; Henning, Loren; Arvind Kutty; Cosler, Doug; Wayne Miller (Miller.Wayne@azdeq.gov); Steve Willis; Eleanor Jennings
Subject: FW: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

I've made the first attempt to put forward the reasons why the Agencies believe a phased implementation approach is necessary. I'm leaving the lab and field test descriptions to those who know more about it – please fill it in. I am purposely forwarding Dan's compliation of comments/concerns again, as he made some very good points about expected reactions from the AF/Amec, and we should try to head off those responses now by providing all the information he is suggesting.

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Monday, March 20, 2017 4:02 PM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Davis, Eva <Davis.Eva@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>
Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

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From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Friday, March 17, 2017 5:55 PM
To: Brasaemle, Karla; Dan Pope; Davis, Eva; Henning, Loren; Arvind Kutty; Cosler, Doug; Wayne Miller (Miller.Wayne@azdeq.gov)
Cc: Eleanor Jennings; Steve Willis
Subject: RE: DFP Notes on the 3/17/2017 WAFB Conference Call

I added some afterthoughts in purple to consider how we use results of (ahem) phased implementation to inform the full scale

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From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Friday, March 17, 2017 3:10 PM
To: Dan Pope <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Kutty, Arvind <AKutty@TechLawInc.com>;

Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>
Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: RE: DFP Notes on the 3/17/2017 WAFB Conference Call

My notes from today:

- Adopt Phased Approach to implementation to collect site specific data to refine model, remedial timeframe estimate and performance criteria.
- Collect samples for microbial analysis to determine bacteria present, evaluate need for bioaugmentation.
- Perform lab testing to evaluate impact of temperature and sulfate loading rates on microbial population
- Incorporate phased implementation in specified areas differentiating between heavy LNAPL areas and dissolved phase areas in LSZ,UWBZ and CZ 3-6 months should be sufficient to evaluate degradation rate in dissolved phase areas, up to a year to evaluate degradation rate in heavy LNAPL areas Will need observation wells spaced within 6 months travel time of injection wells; bromide tracer useful for evaluating flow distribution around well.

Evaluate whether sulfate and tracer reach observation wells, then whether amendment is achieving biodegradation or not

- Update model to verify remedial timeframe, performance evaluation criteria and optimize full scale implementation
- Grid the full treatment area into optimization zones based upon existing conditions identified during characterization: Heavy LNAPL vs dissolved phase, temperature, microbial population, available sulfate, etc for optimized treatment, including possible bioaugmentation
- Install or designate observation wells within gridded optimization zones to evaluate remedy progress
- ADEQ working on alternative model

Carolyn d'Almeida
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"Because a waste is a terrible thing to mind..."

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Friday, March 17, 2017 2:35 PM
To: Davis, Eva <Davis.Eva@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>
Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: DFP Notes on the 3/17/2017 WAFB Conference Call

DFP Notes on the Friday March 17, 2017 WAFB Conference Call:

Loren has said that **performance criteria** are to be emphasized.

Why are regulators proposing a phased implementation?

- Site conditions have changed from those contemplated in the ROD for EBR/MNA
- EBR/MNA has not been tested and proven effective at a site of this size, complexity, and source mass – particularly in terms of the timeframe contemplated
- Therefore, a phased implementation (initially limited in terms of the volume of the subsurface applied) is indicated for proof of concept, and to provide data for EBR design and performance criteria.

Modeling

AF should provide a predictive modeling approach suited to determining timeframes for EBR and MNA to reach the respective goals for those remedy approaches. This modeling will include items related to performance criteria (timelines, triggers, COC concentrations, etc.)

Pre-injection Analyses

Have AF propose their ideas for pre-injection analysis to assess microbiology and geochemistry initial conditions, for comparison to post-injection analyses.

We can propose our own pre-injection analyses to assess microbiology and geochemistry initial conditions, and try to come to a meeting of the minds with AF.

These pre-injection and post-injection tests (for the phased implementation) would form another set of performance criteria; that is, to determine if the appropriate bug populations are developed to proper levels and activity.

Phased Implementation

A phased implementation, applied to a limited area of the site (but all vertical zones) would be the first major milestone (performance criterion) for success; i.e., if the COCs concentrations are lowered to the required concentrations, and stay there, that would be a major step to indicate feasibility of EBR.

A phased implementation could consist of starting EBR at selected sections of the site (i.e., essentially just a portion of what they have already planned for full-scale EBR, so there would not have to be any major changes in terms of approach). That is, pick wells with substantial LNAPL, at least one well in each of the various vertical zones, have injection wells upgradient of the LNAPL wells, and monitoring wells immediately downgradient of the wells, and inject sulfate, etc., as planned for the full-scale EBR. If AF can timely remediate that well so that the COC GW concentrations in those representative wells and the downgradient monitoring wells are (and remain over time) below EBR goals, then that would be strong evidence that a full-scale approach could work.

The chosen LNAPL well should have significant LNAPL – more than a sheen – at least two inches of LNAPL fairly consistently, so that actual remediation of GW in contact with substantial LNAPL can be assessed.

Chosen well should be at elevated temperature, to correspond with the general site conditions.

Reagent injections (sulfate, etc.) should reflect those concentrations, rates, volumes, etc. that are proposed for full-scale EBR.

Assuming the phased implementation continues for at least a year, the changes around the injection wells in terms of microbiology, sulfate concentrations, sulfide production, hydrogen sulfide generation, precipitation of iron sulfides, possible aquifer plugging, changes in pH, etc., can be monitored and evaluated for viability of a full-scale remedy, and any likely dangers, showstoppers, etc.

Fouling should be assessed for all wells (injection, LNAPL, monitoring), to determine the likely needs for well reworking, refurbishing, eventual replacement, etc. This is particularly important for the follow-on contractor (after AMEC's contract expires) to have an idea of long-term costs, and how to bid.

The downgradient monitoring transect can not only monitor COC changes, but also assess the geochemical footprint of downgradient locations, which would be pertinent to evaluating possible enlargement of a sulfate/etc. plume at full scale.

Also, the distribution and concentrations of sulfate achieved downgradient of the injection transect is of great interest. The AF model indicates they can get a reasonable (to them) sulfate distribution, but reality in subsurface environments is often different from the models. The field study should designed to provide suitable data to design injection well spacing, injection rates, injection concentrations, pressures, etc., so as to achieve useful sulfate concentrations across the site.